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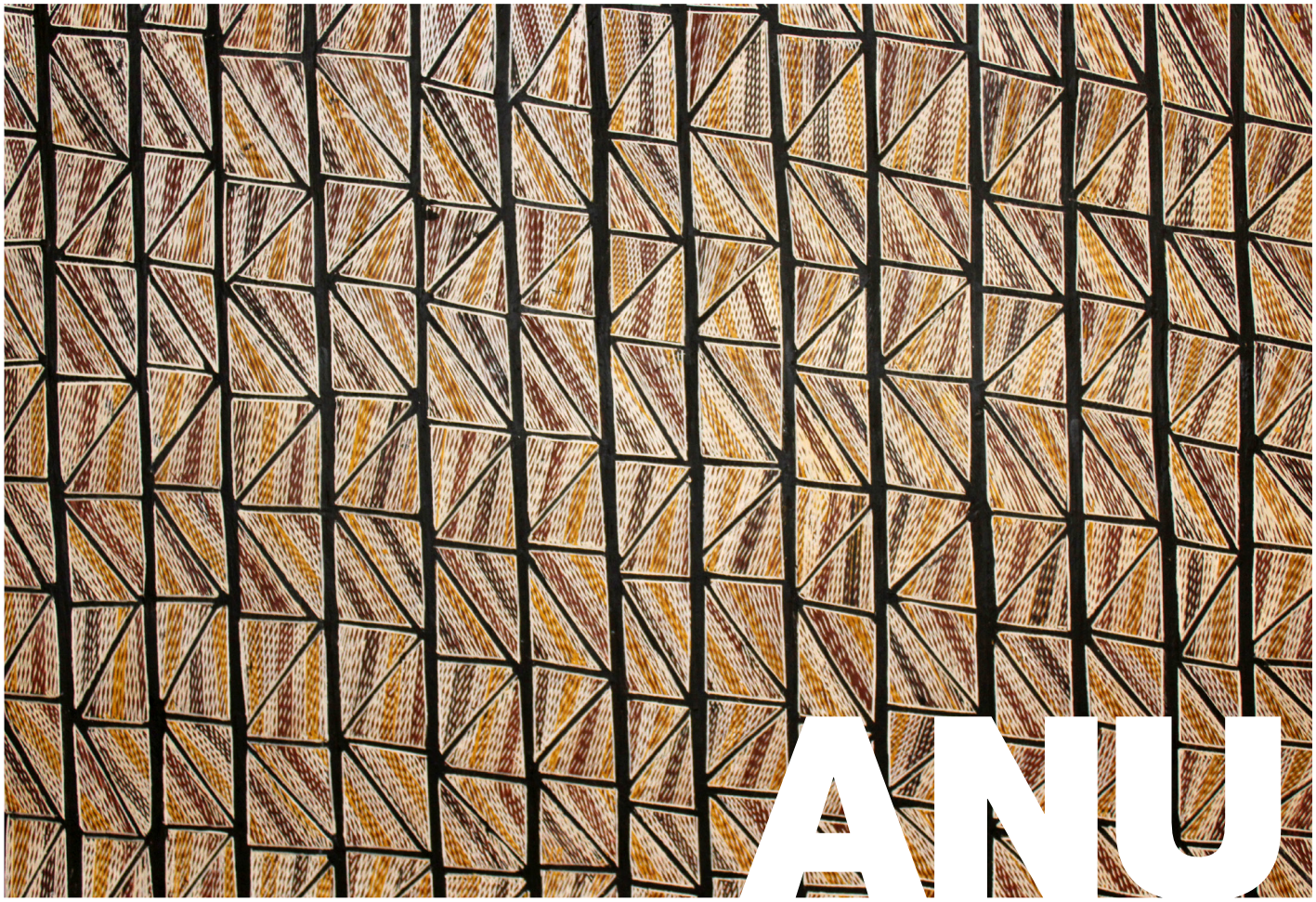

MEASURING AND ANALYSING SUCCESS FOR ABORIGINAL AND TORRES STRAIT ISLANDER AUSTRALIANS

N BIDDLE, M GRAY AND J SCHWAB

Centre for Aboriginal Economic Policy Research
ANU College of Arts & Social Sciences

CAEPR WORKING PAPER NO. 122/2017

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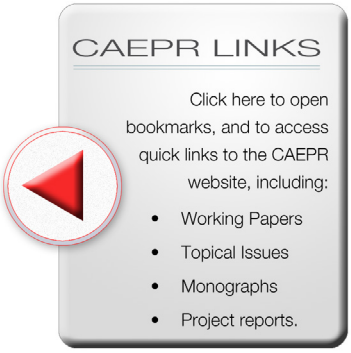
November 2017



Measuring and analysing success for Aboriginal and Torres Strait Islander Australians

N Biddle, M Gray and J Schwab

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Working Paper No. 122/2017
ISSN 1442-3871

ISBN 987-1-925286-21-2

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Abstract

The Closing the Gap targets feature heavily in the current policy measurement framework for Aboriginal and Torres Strait Islander Australians at both the national and state/territory levels. The targets provide concrete measures against which trends in changes in outcomes for the Indigenous population relative to those for the non-Indigenous population can be assessed. Although relative outcomes for the Indigenous population have improved for some of the targets, overall there has been a failure to achieve virtually all of the targets. There are also concerns that the Closing the Gap measures are resulting in an overly negative assessment of progress in improving outcomes for Indigenous Australians, and that they entrench a 'deficits' view of the Indigenous population. The aim of this paper is to provide helpful information to consider when assessing alternative frameworks for measuring and targeting success. We consider how to define success for Indigenous individuals, families and communities; what are the key determinants of success for Indigenous Australians; what are some of the areas of success within the seven target areas and more broadly; and what are the implications for frameworks for measuring success.

Keywords: Closing the Gap, measurement, wellbeing

Acknowledgments

This paper was funded by the Australian Government Department of the Prime Minister and Cabinet, as part of the Indigenous Populations Project. Any findings and conclusions should, however, be attributed to the authors alone.We are grateful to Francis Markham, Will Sanders, Danielle Venn, Rob Bray, and staff from the Department of the Prime Minster and Cabinet for comments on the paper.

Acronyms

ANU	The Australian National University
CAEPR	Centre for Aboriginal Economic Policy Research
CSRM	Centre for Social Research and Methods

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Introduction

One of the major features of Indigenous policy since 2003 has been the systematic reporting by government of socioeconomic and other outcomes for the Aboriginal and Torres Strait Islander (Indigenous) population. This reporting began with the publication, in 2003, of the first edition of the Overcoming Indigenous Disadvantage report by the Steering Committee for the Review of Government Service Provision and the Productivity Commission, and has now evolved to the production of an annual 'Closing the Gap' report presented by the Prime Minister to the Australian Parliament.

Seven Closing the Gap targets feature heavily in the current policy measurement framework for Indigenous Australians at both the national and state/territory levels. These targets, related to education, health and employment, are expressed (with one exception) in terms of the outcomes of the Indigenous population relative to the non-Indigenous population.

The Closing the Gap framework provides a set of targets against which trends in changes in outcomes for the Indigenous population relative to those for the non-Indigenous population can be assessed, and, in broad terms, how the success of government policies related to Indigenous Australians can be be assessed. Targets cover health (life expectancy, child mortality), education (early childhood education, school attendance, literacy and numeracy, Year 12 attainment) and paid employment.

Although relative outcomes for the Indigenous population have improved for some of the targets, overall there has been a failure to achieve virtually all of the targets. There are also concerns that the current Closing the Gap measures are resulting in an overly negative assessment of progress in improving outcomes for Indigenous Australians, and that they can give a misleading assessment of the extent to which government policies and community action have resulted in successes.

The comparison of the wellbeing of the Indigenous population with that of the non-Indigenous population is sometimes described as a 'deficits approach' because of its focus on the gap in wellbeing. A growing number of papers, largely written by Indigenous researchers, argue against a 'deficits approach' to measuring changes in the wellbeing of Indigenous populations (Pholi et al. 2009, Kukutai & Walter 2015). It is argued that a more constructive approach involves building on and learning from the strengths and resilience within Indigenous communities (Hunt et al. 2004, Tsey et al. 2007, Armstrong et al. 2012).

At the core of this discussion is how to define 'success' for the Aboriginal and Torres Strait Islander population and who decides on the definition. Inevitably, the answer will depend on who is answering the question. Often, how governments answer this question will differ from how Indigenous communities answer the question.

The aim of this paper is to provide information to help when considering alternative frameworks for measuring and targeting success. The paper is structured into four sections that examine the following questions:

- How can we define success for Indigenous individuals, families and communities? What does success look like? What are the available and potential measures?
- What are the key determinants of success for Indigenous Australians?
- What are some of the areas of success within the seven target areas and more broadly? This includes longer-term trends in available aspects of success for different groups within the Indigenous population (e.g. by region, socioeconomic status), as well as how they compare (where applicable) with trends for comparable groups within the non-Indigenous population.
- What are the implications for frameworks for measuring success?

Overview of the strengths and weaknesses of the current measurement framework

This section provides an overview of the strengths and weaknesses of the current framework used to monitor changes in outcomes for Indigenous Australians. As noted above, the Closing the Gap framework and other official reporting of outcomes for Indigenous Australians generally take the outcomes of the non-Indigenous population as a benchmark, and compare the gap between the two populations and identify whether it is changing over time.

The specific Closing the Gap targets are:

- close the gap in life expectancy within a generation (by 2031)
- halve the gap in mortality rates for Indigenous children under 5 within a decade (by 2018)

- 95% of all Indigenous 4-year-olds enrolled in early childhood education (by 2025) – renewed target
- close the gap between Indigenous and non-Indigenous school attendance within five years (by 2018)
- halve the gap for Indigenous children in reading, writing and numeracy achievements within a decade (by 2018)
- halve the gap in Year 12 attainment (or equivalent attainment rates) for Indigenous Australians aged 20–24 (by 2020)
- halve the gap in employment outcomes between Indigenous and non-Indigenous Australians within a decade (by 2018).

The broad framework of measuring outcomes in relative terms, and the particular targets that have been selected, have strengths and limitations. When considering alternative or additional measures of success and targets, it is important to resolve the limitations of the current approach without losing its strengths.

Strengths of the current Closing the Gap targets include the following:

- A considerable body of research and other evidence supports the broad outcome areas included, and shows that they are important for wellbeing either as outcomes in their own right or because they are associated with a range of other positive outcomes.[1]
- The outcome measures are defined in a consistent manner and are to be collected regularly.

Limitations of the targets include:

- the narrow range of areas of wellbeing being measured, including that there are no Indigenous-specific measures of wellbeing such as access to land or speaking an Indigenous language, and that there are some important omissions such as imprisonment
- the relative (as opposed to absolute) nature of the measures (although this can also be viewed as a strength for some measures)
- the focus on the gaps between the Indigenous and non-Indigenous populations, which results in a deficits approach
- the unrealistic timeframes for achieving at least some of the targets, although there has been sufficient time for considerable improvements in all of the targets to have been achieved
- the focus only on average outcomes, which means that important changes in distribution of outcomes within the Indigenous population may be missed
- the nationally uniform nature of the targets, which assumes that aspirations and the determinants of wellbeing are unvarying for Indigenous people in all parts of the country
- despite their framing in terms of the relationship between Indigenous and non-Indigenous Australians, the measures not considering the role of non-Indigenous Australians in maintaining gaps (e.g. through discrimination)
- the focus only on changes at the national level, which means that successes or difficulties in particular geographic areas may be obscured.

Potential approaches for developing a new measurement framework

An important issue is the approach taken to identify the outcome measures for targeting and monitoring. A range of approaches is possible. One is a top-down, government service delivery approach that tends to focus on outcomes that are likely to be most amenable to the types of interventions that are within the control of the particular level of government undertaking the exercise. Ideally, these targets might be identified through a clearly articulated theory of change or program logic (Funnell & Rogers 2011), ensuring a feasible link with a particular program/policy or a set of programs/policies.

Another approach to the development of outcomes is through a participatory approach. In this approach, success is defined by Indigenous people themselves. Here, individuals, families or communities affected by an intervention are surveyed or interviewed to identify local priorities and trade-offs that then form the basis of outcomes or targets against which success is measured (Yap & Yu 2016).

A third approach combines elements of the first two, but focuses more heavily on the academic or research literature (qualitative, quantitative and/or conceptual). For example, the capabilities approach to development builds heavily on the conceptual work of Amartya Sen (2001), and then attempts to identify or construct indicators that follow from this academic research.

The following sections outline specific aspects of the setting and measurement of success of the Indigenous population.

The use of relative measures and the appropriate comparison group

The Closing the Gap targets are framed in terms of comparison of the outcomes for the Indigenous population with those for the non-Indigenous population. For some measures, such as educational attainment and income, there are good reasons for believing that relative comparisons are important.

The almost exclusive use of relative measures does, however, have the significant drawback of precluding Indigenous-specific measures that may be vital to the wellbeing of the Indigenous population. Examples of areas that have been identified by many Indigenous Australians as being important but that are perhaps of less relevance (or relevant in different ways) to the non-Indigenous population relate to maintenance of land, language, kinship or family connections, and culture (Biddle & Swee 2012). Furthermore, within more mainstream measures of success, cut-offs or thresholds may need to be established. These include income thresholds, hours worked, levels of education, or more subjective measures of wellbeing. The thresholds that are of relevance to measuring success for the Indigenous population may differ from those for the non-Indigenous population.

A further drawback with the almost exclusive reliance on relative measures is that absolute improvements in an outcome measure for the Indigenous population will be reported as a worsening in the outcome if there was a faster rate of improvement for the non-Indigenous population. For example, between 2005 and 2015, life expectancy for the total Australian population increased 1.9 years for males and 1.2 years for females. Comparing the change in Indigenous life expectancy with the rest of the Australian population will therefore obscure absolute improvements in Indigenous outcomes.

Deciding on and constructing appropriate comparison groups is complex, and often there is no objective way to decide between alternative comparison groups. For example, the Indigenous population is much younger than the non-Indigenous population – should the different age structures of the population be taken into account when constructing the comparison group for measuring the employment target? A much higher proportion of the Indigenous population lives in remote and, in particular, in very remote areas – should this be taken into account when constructing the comparison group for educational participation?

More generally, the Indigenous population is highly diverse, and some targets may only be sensible for some subgroups within that population. This is already acknowledged, for example, with age group–specific targets relating to education and mortality. Comparison groups may need to be spatially targeted, as well as tailored by age group. An analogy with these age-specific targets may be drawn geographically. Is it desirable that, for example, the current targets assume that the wellbeing of a remote-living Indigenous person is maximised by becoming more like the average urban-dwelling, middle-class non-Indigenous Australian? Alternatively, targets might be selected on the basis that they are truly universal, something that is certainly true of the current targets relating to life expectancy and child mortality, but is less clear with some of the other current targets.

Another issue is that the composition of the non-Indigenous population is changing through time. For example, around 9.1% of the non-Indigenous population recorded in the 2016 Census migrated to Australia between 2008 and 2016. It is unclear whether the outcomes for these individuals should be included when comparing the progress or lack thereof for targets set with 2008 as the baseline.

Although it is perhaps inevitable that Indigenous outcomes will continue to be compared with the non-Indigenous population for many purposes, providing a nuanced understanding of success would be enhanced by other types of comparisons:

- Within-Indigenous comparisons – these comparisons identify the background characteristics of Indigenous Australians who are doing relatively well (on whatever outcome measure is chosen) compared with the characteristics of those who are doing less well.
- Through-time Indigenous comparisons – these comparisons, especially when taken over the medium to long term, allow outcomes for the Indigenous population to be measured on their own terms.
- Cross-country Indigenous comparisons – although there are historical and cultural differences between Indigenous Australians and other Indigenous groups internationally, comparing the change through time in outcomes for the Indigenous Australian population with the change through time in outcomes for other Indigenous groups can be a useful guide to the potential effect of institutional or macroeconomic factors.

Level of aggregation

The Closing the Gap targets are framed and measured at the national level, with outcomes and changes in outcomes also reported for individual states and territories. Although this may be sensible from a government accountability perspective or from a service delivery perspective, these levels of geographic aggregation do not necessarily reflect the reality of the geographic coverage of Indigenous communities, which generally are much smaller than an individual state or territory or, in some cases, cross state or territory borders.

In articulating the limits of current demographic and socioeconomic indicators, Morphy (2016) argues that 'the deepest silences, however, are spatial' and that 'there is a characteristic silence – an absence of indicators – concerning the nature and extent of connection to (or, in many cases, severance from) place. For indigenous peoples, this is surely the one factor that uniquely distinguishes them from encapsulating settler populations'.

When constructing indicators for aggregations of Indigenous people below the national or state/territory level, a considerable degree of complexity arises. Using purely geographic measures, there are many options for constructing indicators, with census data (for example) available at three levels – Indigenous Regions (the least disaggregated), Indigenous Areas and Indigenous Localities (the most disaggregated). It is also possible to construct customised geographies building up from Mesh Blocks or Statistical Area Level 1 boundaries. Administrative datasets that are geocoded can also be aggregated to similar structures.

Although most geographical allocations are feasible, that does not guarantee that they reflect social groupings. More importantly, because of high rates of mobility, many Indigenous Australians do not live in the area that they have a place-based attachment to. Kukutai and Taylor (2013) argue that 'the social construction of Indigenous populations in that the categories and contexts employed in this form of postcolonial demography inevitably reflect social and economic institutions that frame the lives of the majority populations. Because such categories are rarely inclusive of Indigenous ways of being, key aspects of Indigenous sociality are either missing or misrepresented in official statistics and the analyses derived from them'.

Methodological and measurement issues

Many of the outcomes of success that have been used or might potentially be used are conceptually quite difficult to capture with existing data. Furthermore, a range of data issues mean that even conceptually straightforward measures can be quite hard to capture accurately.

The main data issue stems from the fact that the Indigenous population is a self-identified one, and that patterns of self-identification change through time and across datasets. Life expectancy, for example, is calculated by comparing the number of deaths for the Indigenous population in particular age groups (from deaths records) with the size of the relevant population at risk. Although there have been improvements through time (methodologically and administratively), it is still the case that a person who is identified as Indigenous/non-Indigenous on a death record may not be identified as Indigenous/non-Indigenous on a census record that is used for the calculation of rates.

Through time, the rate of Indigenous identification is also changing, with data from 2006 to 2011 (Biddle & Crawford 2015) and from 2011 to 2016 (Biddle & Markham 2017) showing that a significant number of people have newly identified as Indigenous over recent intercensal periods. This creates two complications. First, estimates from the census are used as the denominator for measures of success from administrative data systems (e.g. preschool participation). If the level of identification is changing at different speeds in the data from the numerator and denominator, or the data used in the denominator are significantly out of date, this can lead to significant biases in the resultant rates and percentages. This occurred in previous Closing the Gap reports where it appeared that rates of preschool participation were increasing much faster than they actually were because the denominator used was increased at too slow a rate through time.

A second problematic aspect of identification change is that the newly identified population tends to have better outcomes on average than the previously identified population for certain variables (income, employment, education and home ownership), but worse outcomes on other variables (speaking an Indigenous language and being free from exposure to discrimination). It can appear, therefore, that certain outcomes are improving or worsening through time. However, for individual Indigenous Australians, outcomes on average may be moving in the

opposite direction. Furthermore, this problem creates biases when comparing outcomes between states and territories because identification change is concentrated in particular regions. This is possible to control for using linked longitudinal datasets that have Indigenous status measured at more than one point in time. However, these data have their own weaknesses and are rarely used when calculating headline rates.

The first and most important response to the challenge of identification change is to use great care when reporting and interpreting results. Researchers and policy makers need to be aware where the data for both the numerator and denominator come from when calculating rates, and whether identification is likely to be consistent across the different collections. A second response is to make more careful use of existing linked data that have Indigenous status reported at more than one point in time and in more than one context. For example, rather than just identifying the number of Indigenous children attending different forms of education from administrative data and then dividing by a census-based population estimate, with linked data it is possible to calculate rates directly from a dataset with both attendees and non-attendees. A final response would be to update population estimates more frequently using data sources that explicitly measure identification change. This would make it more likely that the denominator used to calculate rates reflects the Indigenous population as identified at that point in time.

Areas of significant worsening of Indigenous outcomes not captured by the Closing the Gap targets

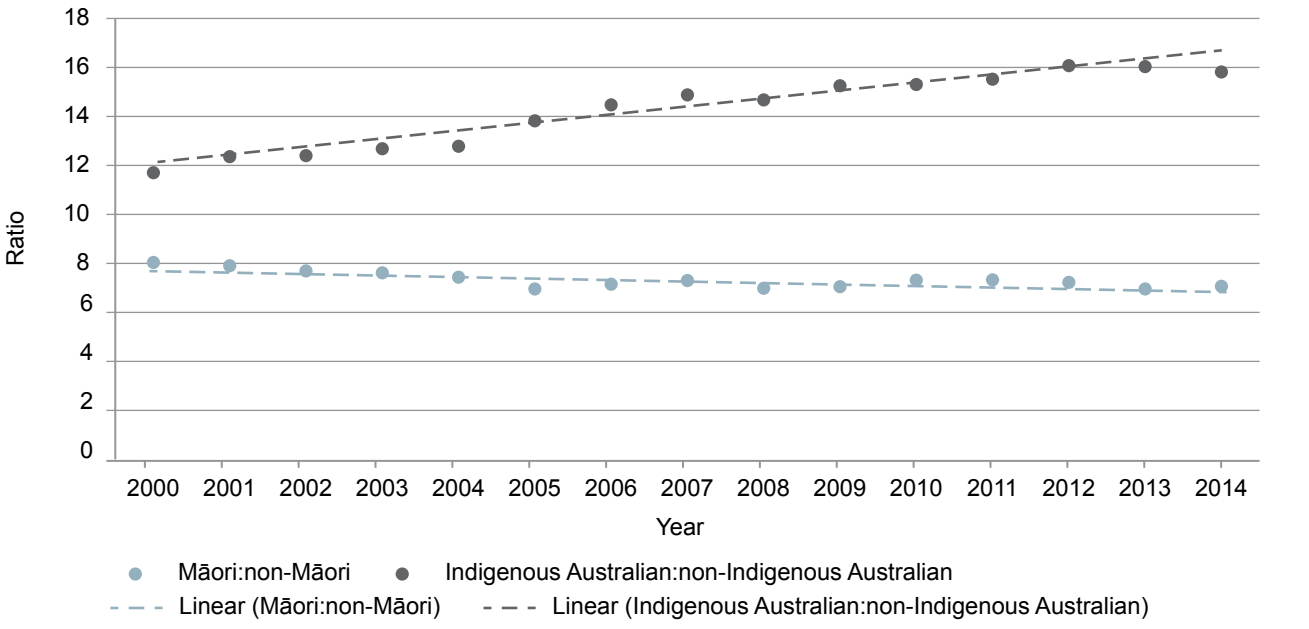
Although evidence suggests that the Closing the Gap targets are tending to result in an overly negative assessment of the extent to which outcomes are improving for the Indigenous population, because some key indicators are not included, the focus has not been as strong on areas in which outcomes for Indigenous Australians are getting worse in absolute and relative terms.

Gray and Hunter (2017) identified two examples where outcomes have worsened substantially in both absolute and relative terms: imprisonment rates and rates of high/very high psychological distress (Figs 1 and 2, respectively). An important point is that, while the Closing the Gap targets are in many cases not being met, they do not paint a picture of worsening outcomes, whereas imprisonment rates and rates of psychological distress reveal a picture of dramatically worsening outcomes for a significant proportion of the Indigenous population.

The importance of measuring outcomes at several points in the distribution of outcomes

As noted above, one limitation of the current Closing the Gap targets is that they consider only average outcomes.

FIG. 1. Ratio of Indigenous to non-Indigenous imprisonment rates (per 1000 000 adult population), Australia and New Zealand, 2000–14



Source: Gray & Hunter (2017)

This means that important changes in the distribution of outcomes within the Indigenous population may be missed. This section illustrates this point using income measures for individuals both nationally and regionally.

When estimated income for different points on the distribution of outcomes is examined nationally, the results show the positive, and very important, finding that median household equivalised income increased substantially between the 2011 and 2016 censuses for the Indigenous population (Table 1). Furthermore, the growth was more rapid for the Indigenous population (10.0%) than the non-Indigenous population (5.4%).

The more troubling finding, however, is that income inequality within the Indigenous population increased over the period, particularly at the upper end of the distribution. The ratio of the top of the income distribution (P90) to the bottom (P10) increased for the Indigenous population from 5.92 in 2011 to 6.48 in 2016. This was

FIG. 2. Ratio of Indigenous to non-Indigenous high/very high psychological distress rates, adult population, age standardised, Australia and New Zealand, 2004–14

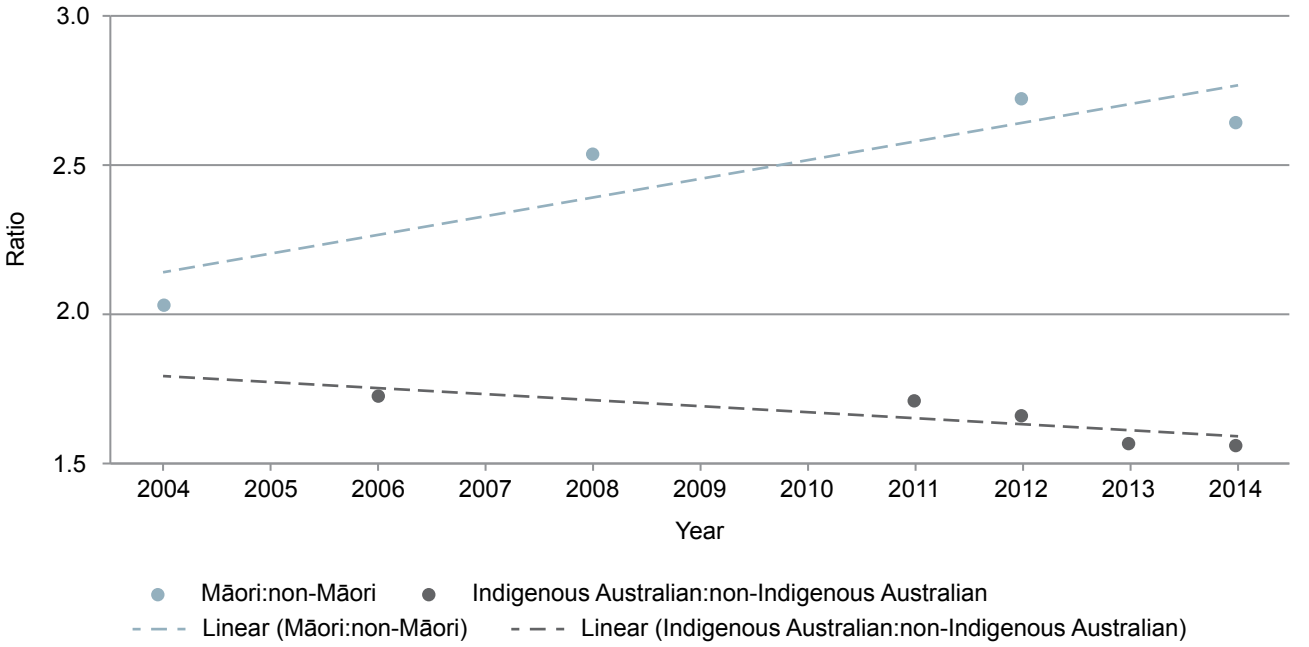


TABLE 1. Distribution of median household equivalised income, by Indigenous status and year

	2011 Census[a]		2016 Census	
Income level	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous
Median[b]	$521	$876	$573	$923
P10[c]	$222	$348	$224	$362
P20	$296	$459	$324	$488
P80	$979	$1499	$1088	$1599
P90	$1318	$1960	$1450	$2050
P90:P10	5.92	5.64	6.48	5.66
P80:P20	3.31	3.26	3.36	3.28
P80:P50	1.88	1.71	1.90	1.73
P50:P20	1.76	1.91	1.77	1.89

a Results adjusted for inflation.
b Income for which 50% of the population have incomes below, and 50% of the population have incomes above.
c Refers to the income for which 10% of the population have incomes below, and 10% of the population have incomes above, with P20, P80 and P90 constructed similarly.

Source: Gray & Hunter (2017)

driven by a large increase at the top of the distribution (generally a good thing), but very little change at the bottom.

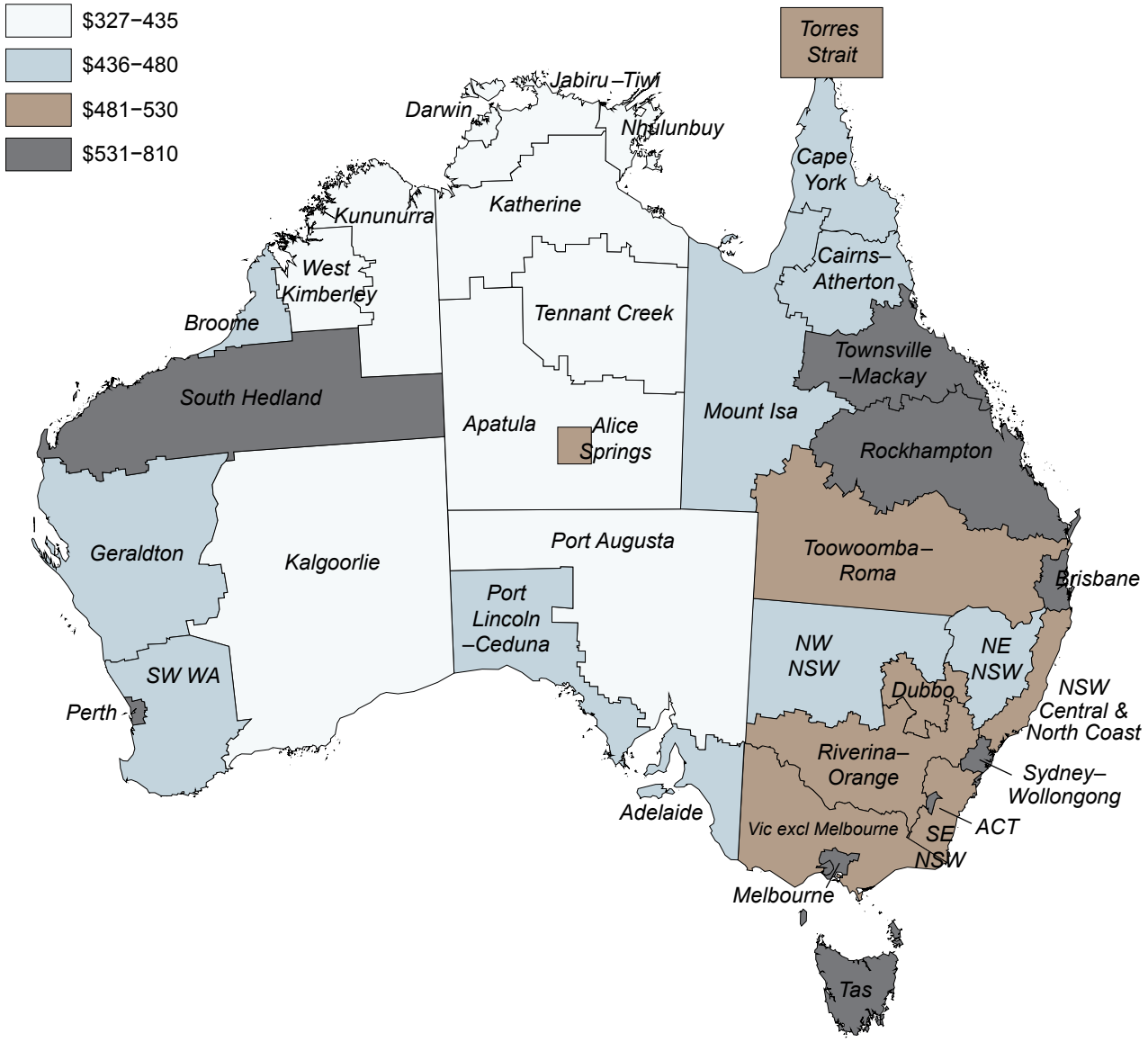
The geographic distribution of income for Indigenous Australians (Fig. 3) also seems to have widened, as shown in a forthcoming paper (Markham & Biddle 2017) and reproduced here. Regions with the lowest median disposable equivalised household income in 2011 had the smallest increases (or even falls) in income between 2011 and 2016 (Fig. 4). Those with the highest incomes in 2011 tended to have the largest increase in income between 2011 and 2016 (Fig. 4).

Determinants of success

A policy framework built around the Closing the Gap targets should ideally take into account what affects an individual's chances of achieving those targets. A small but significant literature examines the determinants of outcomes for the Indigenous population. Within the quantitative literature, this research tends to fall into three different types (with some individual papers including more than one type of research):

- comparing Indigenous and non-Indigenous outcomes while holding constant other characteristics (e.g. Booth & Carroll 2008)

FIG. 3. Median disposable weekly equivalised household income for the Indigenous population, by Indigenous region, 2016

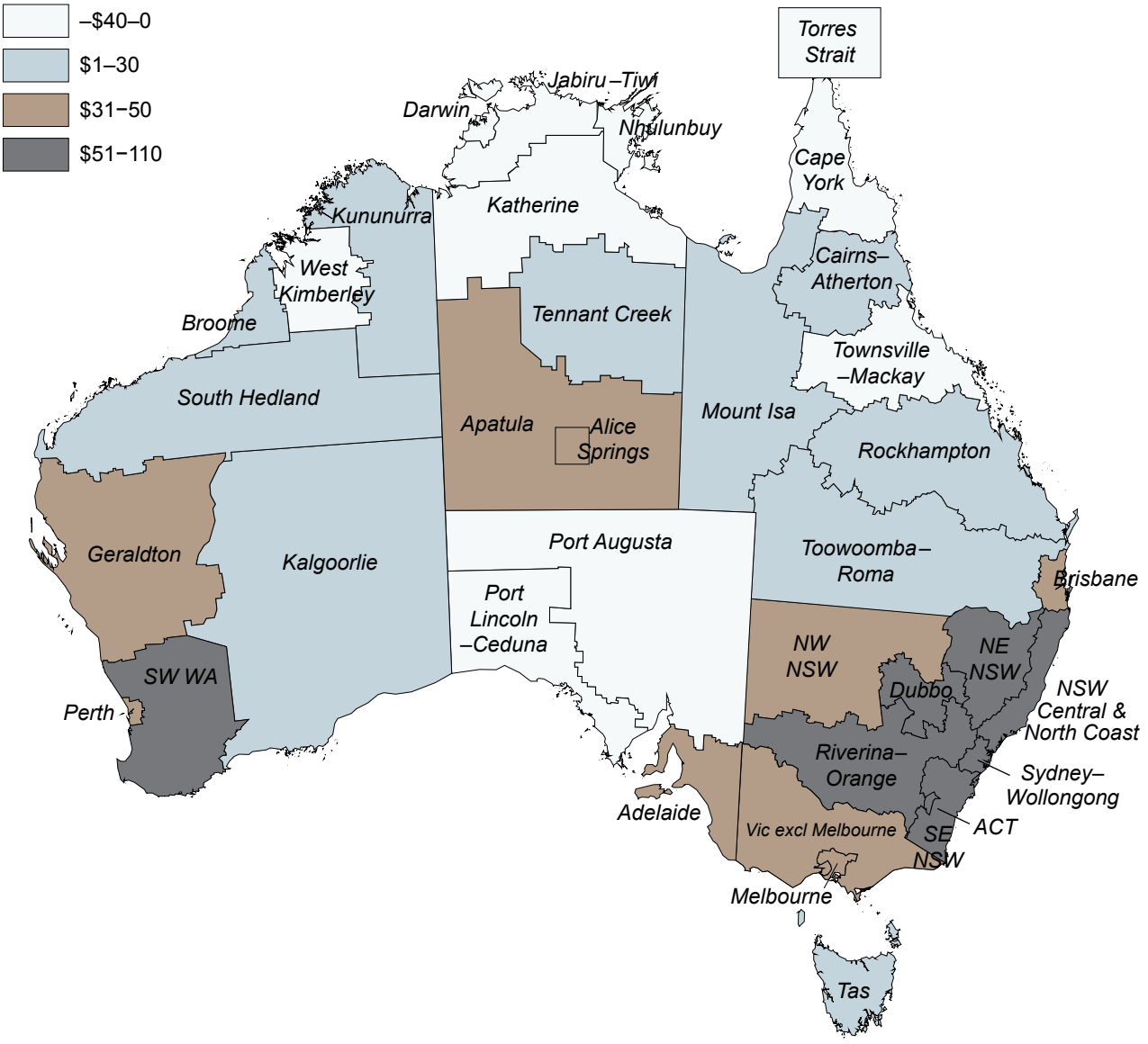


Source: Markham & Biddle (2017)

- measuring the change through time in Indigenous outcomes at a geographic or national level, and relating it to area or macroeconomic factors (e.g. Hunter & Gray 2012)
- looking at the individual-level determinants of Indigenous outcomes and how they explain variation within the population (e.g. Biddle 2014a).

It is very difficult to provide a succinct summary of the literature because the determinants of success vary considerably across the literature and the measures used. However, in general, it is clear that, for almost all outcomes for which comparisons between the Indigenous and non-Indigenous population are of interest, demographic, socioeconomic and geographic characteristics explain a large component of the difference between the two populations. For certain variables (e.g. the probability of arrest, poor health outcomes), a large gap still remains. For others (e.g. school completion, school attendance), Indigenous Australians still tend to have worse outcomes than the non-Indigenous population, but the difference is much smaller than when background characteristics are not controlled for. For a third set of outcomes (e.g. preschool participation), Indigenous Australians have better outcomes than an otherwise identical non-Indigenous Australian.

FIG. 4. Change in disposable weekly equivalised household income for the Indigenous population between 2011 and 2016, by Indigenous region



Source: Markham & Biddle (2017)

In the remainder of this section, we summarise analysis of new data on early childhood education participation; literacy, numeracy and school attendance in late high school; and a range of wellbeing outcomes for Indigenous adults, with a particular focus on the relationship with education.

Early childhood education

In this section of the paper, we explore the role of family background in explaining early childhood outcomes among Indigenous children. An extensive literature examines the effects of early childhood education. Although the findings of the effects for children aged 0–3 years are mixed, experimental and longitudinal studies generally find that, for 3–5-year-old children, high-quality preschool programs have positive cognitive and social development benefits, and improve subsequent school performance (see AIHW 2015 for a review of this literature). The literature also suggests that the biggest benefits from preschool education are largest for children from the most disadvantaged backgrounds. There is also some evidence that high-quality early childhood education can reduce the likelihood of criminal and antisocial behaviour, teen pregnancy and drug abuse (e.g. Hull & Edsall 2001, Barnett 2011, AIHW 2015).

Early childhood education can improve a child's school readiness and close some of the gap between 'at risk' and other students in terms of cognitive development, noncognitive ability (motivation, persistence and self-esteem) and school achievement (e.g. Barnett 1998, Heckman et al. 2006).

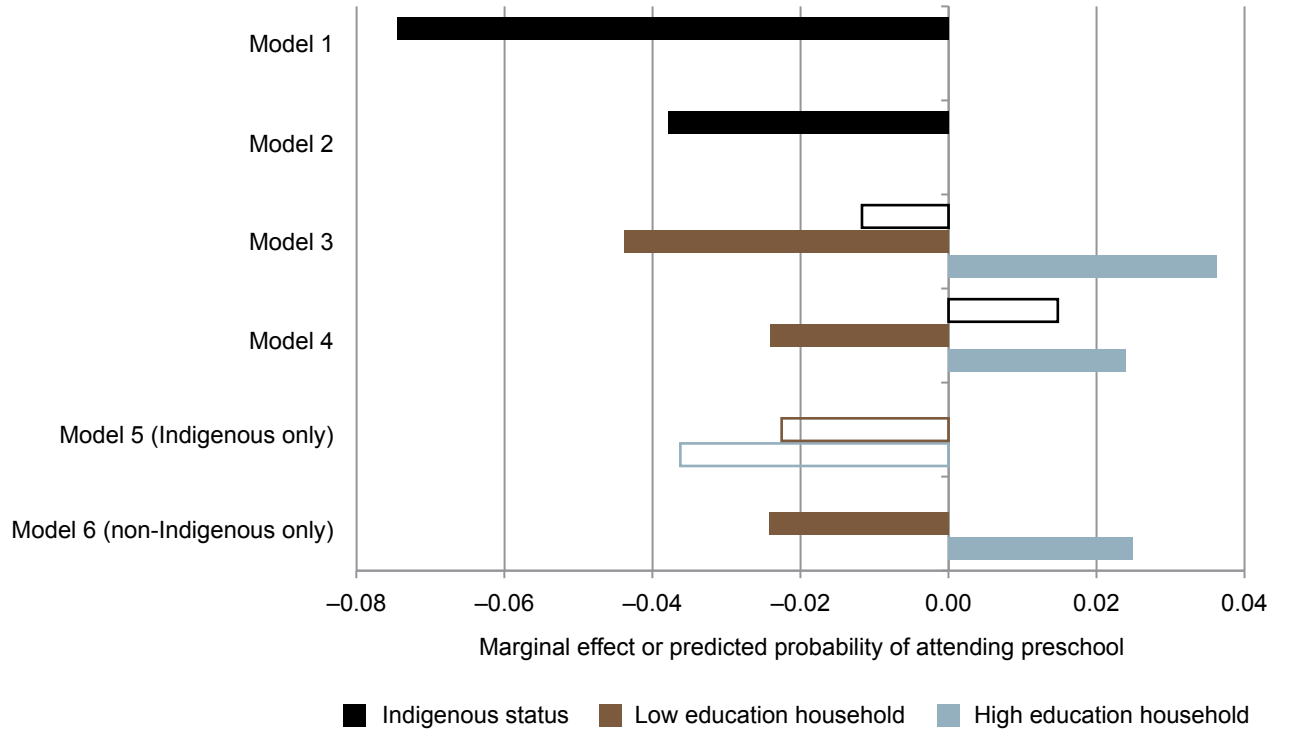
The outcome used in this part of the paper is the probability of a child aged 4 or 5 years (as of August 2011) attending preschool, taken from the 2011 Census Sample File and excluding those who had already commenced full-time schooling. Results are estimated across six models, with the explanatory variables from each model as follows:

- Model 1 – Indigenous status of the child is the only explanatory variable.
- Model 2 – Indigenous status, sex, state/territory of usual residence, child speaks a language other than English at home, changed usual residence in the previous year, number of children aged 0–3 in the household, number of other children aged 4–5 in the household, number of children aged 6–14 in the household, number of adults in the household, and whether there is more than one person per bedroom in the house.
- Model 3 – all variables from model 2, as well as whether there is no-one in the household who has completed Year 12 (low education household) and whether there is someone in the household who has completed a degree (high education household).
- Model 4 – all variables from model 3, as well as whether the equivalised income of the household is zero or negative, whether income is low (between $1 and $399 per week), whether income is high ($1000 or more per week), child lives in a dwelling that is rented privately, child lives in a household that is rented from the government or from a community organisation, and whether the household does not have anyone who is employed.
- Model 5 – all variables from model 4, estimated for Indigenous children only.
- Model 6 – all variables from model 4, estimated for non-Indigenous children only.

Results are presented in detail in Appendix A, and summarised in Fig. 5 through two sets of marginal effects – or differences in the probability of attending preschool while holding all else constant. The first set of marginal effects (for models 1–4) is the difference in probability between an Indigenous and a non-Indigenous child. The second set of marginal effects (for models 3–6) is the estimated association with household education, as represented by whether the child lives in a low education household (no-one in the household has completed Year 12) or a high education household (at least one person in the household has a degree). The base-case household for this second set of marginal effects is one in which at least one person has completed Year 12, but no-one has completed a degree.

A very large difference exists between Indigenous and non-Indigenous children in preschool participation (model 1) that decreases but is not eliminated when demography, geography and household context are controlled for (model 2) (Fig. 5). However, when household education is controlled for, the difference between Indigenous and non-Indigenous children is no longer statistically significant. Furthermore, when income, housing and employment are controlled for, there is weak evidence that Indigenous participation is actually higher. The association with household education may or may not be causal – a number of other things are correlated with education that may affect preschool participation – but the result does show that variation in education across the total population is likely to explain a large part of the difference between Indigenous and non-Indigenous children in preschool participation.

FIG. 5. Determinants of early childhood education participation, 2011



Notes:
1. The base case individual for the full model is a non-Indigenous male living in New South Wales who is aged 5, speaks English at home, did not move during the previous year, and lives in a dwelling owned by the usual residents that has at least one bedroom per usual resident, and in a household with two adults and no other children, with at least one person who has completed Year 12 (but no-one who has completed a degree), with an equivalised income of $400–999 per week and with at least one person employed.
2. Excluded from the analysis are those who have already started full-time schooling, leaving 16 867 children in the 2011 Census Sample File for the analysis (of whom 779 are Indigenous and the remainder non-Indigenous).
3. Those differences that are statistically significant at the 5% level of significance are represented using a filled box. Those that are not statistically significant are represented using a hollow box.

Source: 2011 Census Sample File

Household education is clearly important for the total population and for the non-Indigenous population, as shown in model 6. Compared with the base-case child, non-Indigenous children in low education households have a lower probability of attending, and those in high education households have a higher probability of attending. The relationship for Indigenous children is, however, a little more complicated. Although the coefficient for low education households is not statistically significant (with a sample size of 651 children, this is perhaps not surprising), the size of the estimated marginal effect is comparable with non-Indigenous children.

The bigger difference between the two populations is for the high education variable. Whereas those non-Indigenous children who live in a household where at least one person has a degree are significantly more likely to be attending preschool, there is no significant difference for Indigenous children. Leaving aside statistical significance, the coefficient is negative and the marginal effect is large, showing that, if anything, those Indigenous children in high education households are slightly less likely to attend.

This finding may be a small sample issue – only 7.2% of Indigenous children in the sample lived in a high education household. However, a similar result was found when the 2006 Census Sample File was anaylsed, either separately or as part of a pooled sample. The result does, therefore, give prima facie evidence that the relationship between parental or carer education and preschool participation is not necessarily the same for Indigenous and non-Indigenous children. When designing policy related to the early childhood education target in the Closing the Gap framework, these findings need to be considered.

Literacy, numeracy and school attendance

A considerable focus of policy is on school attendance and literacy/numeracy outcomes for the Indigenous population, with a significant amount of research showing a strong and direct link between the two (Hancock et al. 2013). In this section of the paper, we use recently

released data from the Programme of International Student Assessment (PISA) to look at three research questions related to these outcomes:

- What is the difference between Indigenous and non-Indigenous 15-year-olds on these outcomes without controlling for background characteristics?
- What are the differences between Indigenous and non-Indigenous 15-year-olds once demographic, geographic and parental socioeconomic/education characteristics are controlled for?
- How are these factors associated with the outcomes for Indigenous youth specifically?

Full results from the analysis are given in Appendix B; however, the results can be summarised as follows:

- In an index of English, mathematics and science test scores, the difference between Indigenous and non-Indigenous students is equal to 0.69 times one standard deviation, without controlling for background characteristics. For the standard normal distribution, about 68% of observations usually fall within one standard deviation of the mean, so this is a very large difference. Once background characteristics are controlled for, this difference drops to 0.52 times one standard deviation.
- Within the Indigenous population, those with the lowest outcomes on this measure of success are males; those living in regional areas, particularly in remote areas; and those who do not have a parent who has completed Year 12. Those with the highest test score have at least one parent with a degree. There is no association between test scores and having attended preschool, and also no difference between those youth who have a parent with some post-school education but no parent with a degree.
- The difference in the probability of the student reporting that they skipped school at least once in the past two weeks is 0.093, without controlling for background characteristics (probability of 0.374 for the Indigenous population compared with 0.281 for the non-Indigenous population). When background characteristics are controlled for, the difference falls to 0.076 (probability of 0.370 compared with 0.294).
- Within the Indigenous population, the probability of skipping school is highest for females and those who do not have a parent who has completed Year 12. There is no difference by remoteness, preschool participation or post-school qualifications of parents.

Indigenous wellbeing

In this section of the paper, we look of four sets of adult outcome success measures, based on the 2014–15 National Aboriginal and Torres Strait Islander Social Survey:

- economic outcomes – probability of being employed (for those aged 64 years and under), personal income for those who are employed and probability of living in a household that could raise $2000 in a week
- subjective wellbeing – probability of being a happy person all or most of the time in the previous four weeks, probability of not being so sad that nothing could cheer you up even some of the time in the previous four weeks, low to moderate psychological distress (based on the Kessler-5 scale) and life satisfaction
- health outcomes and health behaviour – probability of self-assessed health being good, very good or excellent (cf. fair or poor); probability of not being a daily smoker; and probability of not reporting risky alcohol consumption in the previous two weeks
- social and community outcomes – probability of having attended cultural events in the previous 12 months, probability of being able to have a say within the community on important issues, and probability of not being a victim of physical or threatened violence in the previous 12 months.

Several outcomes for the Indigenous population vary quite considerably by remoteness and sex (Fig. 6). Those in nonremote areas are significantly and substantially more likely to be employed than those in remote areas, and also more likely to live in a household that could raise $2000 in a week and not be a daily smoker. Those in remote areas, however, were more likely to report that thay were a happy person all or most of the time, attend cultural events, and feel they are able to have a say within their community on important issues (for males).

There are, of course, many other potential determinants of wellbeing outcomes than the variation in the outcomes between remote and nonremote males and females shown in Fig. 6, and there are also other characteristics that might explain the variation in the outcomes. That is, are the differences observed in Fig. 6 due to other observable characteristics? In the remainder of this subsection, we follow a modelling approach to look at the Indigenous-specific determinants of wellbeing.

The models for two of the variables (personal income and life satisfaction) are estimated using simple linear regression. The models for the remaining 10 variables are estimated using maximum likelihood estimation, assuming the probit model. To analyse the determinants of these success measures, we used the following explanatory variables:

- age – 15–24-year-olds, 25–34-year-olds, 55–64-year-olds, and those aged over 65 (relative to 35–54-year-olds)
- lives in a remote area
- female
- not married
- family status – couple family with children under 15, couple family with no children under 15 but with dependent children, single-parent family with children under 15, single-parent family with no children under 15 but with dependent children, and other family (relative to couple families without children)
- lives in a household with at least one non-Indigenous usual resident
- speaks a language other than English
- changed usual residence in the five years preceding the survey
- high-school education – completed Year 10 or 11, and completed Year 9 or less (relative to those who completed Year 12)
- post-school education – has a degree or higher, has a diploma, has a Certificate I or II, and has a Certificate III or IV (relative to those without a post-school qualification).

Given the very different distribution of the outcome measures, we summarise the relationship between the outcome measures and the determinants of success in terms of direction and statistical significance (Table 2). Results are discussed below the table for the main sets of explanatory variables. Full results are given in Appendix C.

It is likely that the determinants of wellbeing vary substantially across many of the explanatory variables used in the model, particularly remoteness, age and sex. There is some evidence for this in the existing literature (Biddle 2014a), with Biddle (2015) showing, for example, that income has a smaller association with wellbeing in remote areas, and for females, than it does for nonremote males. These interactions, however, are beyond the scope of this paper.

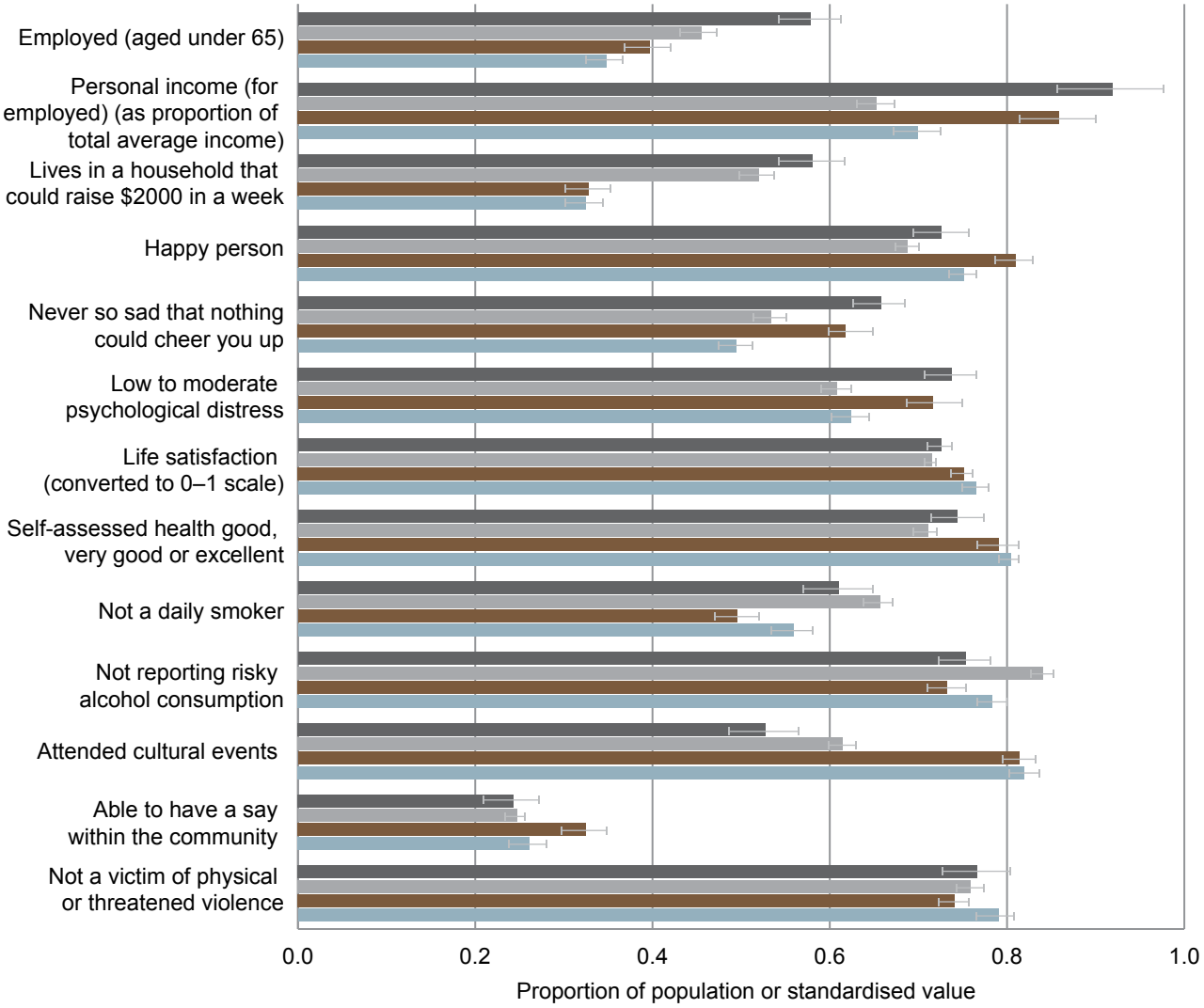
Remoteness

There is a complicated relationship between remoteness and the measures of success, with the findings conflicting with some of the policy narratives that have been expressed over recent years, as well as with simple descriptive statistics. Keeping in mind that a range of other characteristics are controlled for in the analysis (including levels of education), it is somewhat surprising, but quite important to note, that those who live in remote areas have a significantly higher probability of being employed than those in nonremote areas, as well as a higher estimated income (for those employed). The third economic variable (ability to access emergency cash), however, is lower for those in a remote areas.

Similar findings have been found using other sources of data. Using 2006 Census data, Biddle and Yap (2010) showed that, after a range of other characteristics were controlled for, there were no differences in employment probabilities between those who lived in a major city and those who lived in other parts of the country. The results in Table 2a are a little stronger than that finding, but broadly similar. This does not mean that encouraging a large number of people to move to remote areas will improve Indigenous employment. First, the data are cross-sectional and not causal, and mobility itself may reduce employment prospects. Second, a large increase in the labour force in remote areas may lead to competition for the jobs that are available, reversing the above finding. Third, the association was only positive after education outcomes (described below) were held constant. As these variables are substantially lower in remote areas (Biddle & Yap 2010), the net effect of living in a remote area is still negative (see Fig. 6). Nonetheless, the results strongly imply that encouraging Indigenous Australians to move to nonremote areas is unlikely to improve employment outcomes in and of itself, and that the greater barriers are skills and English language proficiency.

Of the three subjective wellbeing measures, living in a remote area was associated with a higher value/probability for two of them (happiness and life satisfaction), with no difference for the third. Self-assessed health is also higher, while the two health behaviour variables (smoking and risky alcohol consumption) are lower. Those who live in remote areas are also more likely to have attended a cultural event, but are less likely not to have been a victim of violence.

FIG. 6. Wellbeing outcomes by remoteness and sex, 2014–15



Notes:
1. Replicate weights are used to create population estimates and standard errors.
2. The two continuous variables are presented on a similar scale, with life satisfaction converted from a 0–10-point scale to a 0–1-point scale, and income for the relevant Indigenous populations divided by the income for the total Australian population using the General Social Survey to give a relative income.
3. The 'whiskers' around the estimates represent the 95% confidence interval.

Source: 2014–15 National Aboriginal and Torres Strait Islander Social Survey

TABLE 2a. Relationship between demographic, geographic and education factors, and economic and subjective aspects of wellbeing

Explanatory variables	Employed (aged 15–64)	Personal income (for employed)	Lives in a household that could raise $2000 in a week	Happy person	Never so sad that nothing could cheer you up	Low to moderate psychological distress	Life satisfaction
Aged 15–24 years	---	---		+++	+++	+	+++
Aged 25–34 years	-	-		+++	+	++	
Aged 55–64 years	---		+++	+++	+++	+++	+++
Aged 65 years and over	na		+++	+++	+++	+++	+++
Living in a remote area	++	++	---	+++		+++	+++
Female	---	---	---	---	---	---	
Not married	---	---		--	---	---	---
Couple family with children under 15	---		--		+		+++
Couple family with no children under 15 but with dependent children		+++				+	
Single-parent family with children under 15		+++	---				
Single-parent family with no children under 15 but with dependent children		+++	---				
Other family		+++	--				
Lives in a household with at least one non-Indigenous usual resident	+++	-	+++		+++	+++	+++
Speaks a language other than English	--	---	---	++			+++
Changed usual residence in the 5 years preceding the survey	---	+	---		---	---	--
Completed Year 10 or 11	---	---	---	--	---	---	-
Completed Year 9 or less	---	---	---	---	---	---	---
Has a degree or higher	+++	+++	+++		+++	+++	+++
Has a diploma	+++	+++	+++	+			
Has a Certificate I or II	+		+		--	--	
Has a Certificate III or IV	+++	+++	+++				

na = not applicable
Note: Variables that have a negative association relative to the base case at a 1%, 5% and 10% level of significance are listed as ---, -- and -, respectively. Those with a positive association are listed as +++, ++ and +, respectively.
Source: 2014–15 National Aboriginal and Torres Strait Islander Social Survey

TABLE 2b. Relationship between demographic, geographic and education factors, and health and community aspects of wellbeing

Explanatory variables	Self-assessed health good, very good or excellent	Not a daily smoker	Not reporting risky alcohol consumption	Attended cultural events	Able to have a say within the community	Not a victim of physical or threatened violence
Aged 15–24 years	+++	+++	+++	-	---	
Aged 25–34 years	+++				---	---
Aged 55–64 years	---	+++	+++		+++	+++
Aged 65 years and over	--	+++	+++	--	+++	+++
Living in a remote area	+++	---	---	+++		---
Female	--	+++	+++	+++	---	+++
Not married	--	+++				
Couple family with children under 15	+++	+++	+++	+++	+	
Couple family with no children under 15 but with dependent children		+++	++			+++
Single-parent family with children under 15	+	-				---
Single-parent family with no children under 15 but with dependent children						
Other family		---				---
Lives in a household with at least one non-Indigenous usual resident		+++		---		
Speaks a language other than English	+++	+++	+++	+++	+++	+++
Changed usual residence in the 5 years preceding the survey		---			-	---
Completed Year 10 or 11		---		---		---
Completed Year 9 or less	---	---				---
Has a degree or higher	+++	+++	+++	+++	+++	
Has a diploma	++	++	+	+++	+++	
Has a Certificate I or II				+++		---
Has a Certificate III or IV			+	+++	+++	

Note: Variables that have a negative association relative to the base case at a 1%, 5% and 10% level of significance are listed as ---, -- and -, respectively. Those with a positive association are listed as +++, ++ and +, respectively.
Source: 2014–15 National Aboriginal and Torres Strait Islander Social Survey

Gender

There is a similarly complicated relationship between gender and success. Females have lower values for the three economic variables and for two of the subjective wellbeing variables. Self-assessed health is slightly lower, but only at the 10% level of significance, and the two health behaviour variables are significantly higher for females than for males.

Females are more likely to have attended cultural events, and also more likely not to have been a victim of violence. However, previous analysis of 2008 National Aboriginal and Torres Strait Islander Social Survey data has shown that 'Indigenous females are significantly more likely to have been physically injured or harmed in the most recent violent episode (35.3% compared to 30.9% for Indigenous males)' (Biddle 2011).

Perhaps one of the more important findings about gender is the association with being able to have a say within the community. For many people for whom social status and standing are important, this is an important aspect of wellbeing. The results in Table 2b show, however, that females are less likely to report that they are able to have a say within the community.

Household and family status

Family status is an important explanatory variable for many of the outcomes of interest. In general, those living in couple families tended to have better outcomes than single-parent or other families, with dependent children also associated with a higher probability of success.

Living in a household with non-Indigenous members was also associated with a higher probability of many of the success measures. The only exception to this was personal income (for those employed), which was lower but only at the 10% level of significance, as well as attendance at a cultural event, which was lower at the 1% level of significance.

Indigenous language

In many ways, speaking an Indigenous language could be used as an outcome variable in the analysis. However, it is also important to note that it was strongly associated with many of the other success measures. For the economic measures, speaking an Indigenous language is associated with a lower probability of success, with a particularly strong negative relationship with income and avoiding financial stress.

Although there is a negative relationship with the economic variables, there is a positive relationship between speaking an Indigenous language and the remainder of the measures of success. The relationship with the measures of subjective wellbeing is quite weak, but there is a very strong relationship with the health outcome and health behaviour measures, as well as a strong relationship with the social variables (Table 2b).

Mobility

Having changed usual residence in the previous five years is negatively associated with many of the measures of success (with a weak positive association for the income of those who are employed). In particular, there was a strong negative association between mobility and financial stability, two of the three subjective wellbeing measures, not being a smoker, and having avoided physical and threatened violence.

It is possible that this correlation is capturing a causal relationship – for example, using longitudinal data, it was shown that moving from a remote to a nonremote area was associated with a lower probability of employment. However, for this variable, it is particularly important to keep in mind that mobility itself may have been affected by lagged values of the outcome variables.

Education

The final set of variables in Tables 2a and 2b highlights the very strong positive association between education and success. Having not completed Year 12 was negatively associated with 10 of the 12 measures of success (to varying degrees), with post-school qualifications positively associated with 10 of the 12 measures.

Although it is difficult to gauge from the tables, the detailed results from the analysis (Appendix C) show that not all post-school education has the same association. For two of the outcome variables (negative emotional wellbeing and victimisation), having a Certificate I or II was negatively associated with the measure of success. Furthermore, for most of the variables, a degree and, to a lesser extent, a diploma had a much larger marginal effect than having a certificate. Nonetheless, the results show the very strong potential for improving a range of outcome measures from individuals, communities and the government investing in education.

Monitoring success over the short and long term

The most recent Closing the Gap report (PM&C 2017) identified a lack of progress in many of the targets agreed to by the Council of Australian Governments. Although a very important target – infant mortality – had been met or was on track to be met in most jurisdictions, the other targets look unlikely to be met.

This lack of progress inevitably feeds a narrative of policy failure. So far as this leverages a sensible addition of new resources as well as careful recalibration of policy settings and priorities, one could argue that the targets are doing their job. They are holding governments at all levels to account, and identifying areas of relative success and failure. Where this becomes problematic is when the same results are used to either entrench negative views of Indigenous Australians, argue for wholesale changes to policy settings that ignore success where it has occurred, or create a narrative of policy intractability.

One way to counter or add nuance to these narratives is to take a longer-term perspective than just year-on-year change or change over a single intercensal period. Altman and Biddle (2015) analysed census data from 1971 (the first census after the 1967 referendum) to 2011 and found that, although there had been progress on many indicators over the long term, at the rate of progress, achievement of parity for many of the available indicators would take generations.

A second way to use the targets for a more constructive policy debate is to use a more disaggregated geography and look at change at a local or regional level. If done carefully while taking into account geographic mobility and boundary change, such analysis identifies regional and local variation in policy that has been successful (and can be built upon) as well as areas that have been less successful that need to be tackled.

A third approach is to identify domains of policy that has been successful and transfer lessons learned to other policy domains. For example, although it is not possible to sensibly claim that Indigenous perspectives and needs have been incorporated into all aspects of health service delivery, significant progress has been made in a number of health domains (including infant mortality), and the number of doctors, nurses and health practitioners that identify as Aboriginal and/or Torres Strait Islander has increased significantly (Kimpton & Smith 2015). This experience can be transplanted to other domains such as education, housing and the criminal justice system.

Despite many of the targets not being on track to be met, it is important to recognise that considerable improvement has occurred in a number of related outcomes. This is demonstrated in Table 3, which looks at three measures of education success, for three census years (2006, 2011 and 2016).

The results in Table 3 do not line up exactly with the relevant Closing the Gap targets. For example, no current data on post-school qualifications are available, meaning it is not possible to estimate a Year 12 equivalent education acquired through the Vocational Education and Training system. Furthermore, there is uncertainty with the preschool measure as to whether all children enrolled in a preschool program through a long day care centre are captured in the numerator. Nonetheless, the variables are measured consistently through time, and they are all based on a closed population (i.e. there is information in the one dataset for both the numerator and the denominator).

With these caveats in mind, and remembering the large association between education and other measures of success shown in Tables 2a and 2b, the results presented in Table 3 show significant progress in reducing disparities between Indigenous and non-Indigenous Australians in early childhood education, school completion and ongoing education participation. Nationally, according to the 2016 Census, nearly the same proportion of Indigenous 4–5-year-olds is attending preschool as non-Indigenous children. It is true that the gap has not completely closed, and there is still a significant minority of Indigenous (and non-Indigenous) children not attending preschool. However, there are now many more Indigenous children attending preschool than ever before, with much of that growth occurring between 2011 and 2016.

There has also been a relative and absolute increase in the proportion of Indigenous young adults who have completed Year 12. It is true that less than half of Indigenous 20–24-year-old males have done so; however, the percentage has increase from around one-third (33.2%) in 2006 to just under half in 2016 (48.5%). This indicator is a lagged reflection of previous policy decisions (a 24-year-old in 2016 was making initial decisions about whether to continue on at high school before the Closing the Gap targets were even set). However, the growth in the percentage of youth and young adults currently participating in education (the last set of results in the table) suggests that there has been recent success and that education attainment is likely to continue to increase.

TABLE 3. Change in key education outcomes, 2006, 2011 and 2016

Education	Year	Indigenous male (%)	Non-Indigenous male (%)	Male ratio	Indigenous female (%)	Non-Indigenous female (%)	Female ratio
Children aged 4–5 years attending preschool (excluding those in full-time schooling)	2006	62.9	75.2	0.837	62.5	75.0	0.833
	2011	62.3	72.0	0.866	63.7	72.1	0.883
	2016	68.7	72.3	0.950	69.2	72.6	0.954
Adults aged 20–24 years who have completed Year 12	2006	33.2	70.1	0.475	38.5	79.0	0.488
	2011	38.2	72.2	0.528	43.5	80.6	0.539
	2016	48.5	77.1	0.629	53.9	84.2	0.640
Youth and adults aged 15–24 years participating in education	2006	33.2	53.6	0.619	35.7	56.8	0.628
	2011	37.6	56.1	0.670	40.0	60.1	0.666
	2016	40.3	59.4	0.678	44.8	63.6	0.705

Note: Individuals who did not state their Indigenous status are excluded from the calculations.
Source: Customised calculations using the 2006, 2011 and 2016 Census of Population and Housing

Conclusions and implications for frameworks for measuring success

Success is a complicated concept to define, especially when doing so for a large and diverse population group. It is also difficult to capture statistically. For example, working a full-time job might well be a key indicator of success for one person, whereas it might be an indication of a lack of financial savings and alternative livelihood activities for another. There are technical and methodological issues, many of which were covered in this paper. There are also, however, political and ideological issues that are beyond the scope of this paper, but nonetheless cannot be ignored.

Despite the challenges in defining and measuring success, it is vital that data be carefully used to document changes in outcomes for Aboriginal and Torres Strait Islander Australians, to identify areas of success as well as areas in which things are not improving to tell a nuanced story. In 2017, Indigenous journalist and academic Stan Grant wrote, 'The Indigenous middle class is growing. Indigenous people are on our television screens, on our stages and our sporting fields. We don't tell this story often enough. We don't even yet have a language for Aboriginal success' (Grant 2017).

The main official way in which progress or success is currently measured and articulated at a national level by government is through the Closing the Gap targets. The frameworks underlying these targets require the outcome measures to be defined in a consistent manner and to be collected regularly.

Although this type of approach has limitations, particularly in relation to fully capturing the breadth and diversity of Indigenous experiences (Altman 2016), it is clear that targets serve a useful policy purpose by ensuring that all levels of government are accountable, and that outcomes are measured consistently and robustly (Biddle 2014b). Furthermore, there is a strong evidence base that the areas covered by the Closing the Gap targets are important for broader measures of Indigenous wellbeing and success. There are, however, several limitations of the current targets.

Perhaps the biggest limitation of the targets is that they are all focused on averages and do not recognise the diversity and variation within the Indigenous population. It is possible that, while average wellbeing may be improving, there may be subpopulations for whom wellbeing is deteriorating. The targets are set at the national level, which can result in significant improvements at a more disaggregated level being ignored. Significant improvement has been shown in socioeconomic outcomes for particular geographic areas within Australia, with average values in other areas worsening through time (Biddle 2013).

By continuously focusing on the failure to meet targets, there is a risk that a narrative is created or entrenched that Indigenous Australians themselves are incapable of success. Regional, community and individual variation make it clear that this is not the case, and failure to identify the heterogeneity in outcomes may result in misleading conclusions about the effectiveness of policies and programs, or in policies and programs not being directed where they are most needed.

A second limitation of the targets is that they do not represent the diversity of aspirations among the Indigenous population, nor do they include any measures that may be considered to be Indigenous-specific. Some Indigenous people have raised concerns that many of the indicators commonly used to capture Indigenous wellbeing are drawn from Western concepts that fail to capture notions of a 'good life' that resonate with Indigenous people themselves (Yap & Yu 2016). That is not to say that the targets themselves are not important, but rather that they are incomplete.

In addition to Indigenous-specific notions of wellbeing, the Closing the Gap targets do not include measures directly related to, for example, housing, exposure to the criminal justice system or financial stability. All of these areas have been shown to relate to wellbeing and other notions of success, and are well within the domain of government policy.

The current targets are mostly focused on Indigenous outcomes relative to those of the non-Indigenous population. This means that improvements in the outcomes of the Indigenous population are downplayed if those of the non-Indigenous population are also changing. It can result in a 'deficits approach' (Vass 2013) where non-Indigenous outcomes are the norm, and the failure of Indigenous Australians to achieve that norm is seen as inherent to the population.

The targets are forward-looking from the baseline year (usually 2008). This can obscure instances of long-term, albeit incremental, improvement up until 2008, and it also makes the measures more susceptible to the stage of the economic cycle at which data collection takes place. We argue for a more long-term focus to complement the yearly monitoring of change.

Ultimately, success can only be defined by Indigenous Australians themselves. Where this has occurred, the outcomes chosen have almost exclusively tended to be a mix of those well captured in Western or mainstream systems (financial independence, human capital development, healthy lives) and others that are more Indigenous-specific (maintenance of land, language and culture). Once those measures have been articulated, however, it is up to all stakeholders (governments, researchers, community organisations) to ensure that the change in outcomes is captured in a robust way, that policies are rigorously evaluated against whether they contribute to the achievement of those outcomes, that data and the power that goes with data are shared, and that individual and community-level success is shared and articulated where it does occur.

Appendix A Factors associated with early childhood participation

TABLE A1. Coefficient estimates and *P*-values for relationship between preschool participation and household education/Indigenous status

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Explanatory variable	Coeff	*P*-value	Coeff	*P*-value	Coeff	*P*-value	Coeff	*P*-value	Coeff	*P*-value	Coeff	*P*-value
Indigenous	–0.212	0.000	–0.174	0.001	–0.055	0.284	0.077	0.190				
Female			0.020	0.345	0.025	0.248	0.023	0.315	0.292	0.008	0.009	0.701
Victoria			–0.064	0.023	–0.070	0.014	–0.077	0.010	–0.404	0.052	–0.070	0.022
Queensland			–0.560	0.000	–0.554	0.000	–0.570	0.000	–0.809	0.000	–0.566	0.000
South Australia			0.267	0.000	0.289	0.000	0.306	0.000	–0.054	0.835	0.321	0.000
Western Australia			0.213	0.000	0.232	0.000	0.221	0.000	–0.002	0.994	0.229	0.000
Tasmania			–0.670	0.000	–0.631	0.000	–0.622	0.000	–0.561	0.046	–0.648	0.000
Northern Territory			0.644	0.000	0.680	0.000	0.772	0.000	0.261	0.485	0.691	0.000
Australian Capital Territory			–0.075	0.387	–0.120	0.169	–0.142	0.114	0.161	0.808	–0.146	0.106
Aged 4			–0.522	0.000	–0.541	0.000	–0.559	0.000	–0.705	0.000	–0.553	0.000
Speaks a language other than English			–0.197	0.000	–0.224	0.000	–0.156	0.000	0.805	0.005	–0.169	0.000
Changed usual residence in previous 12 months			–0.085	0.003	–0.069	0.016	–0.026	0.416	–0.041	0.752	–0.024	0.467
Number of children under 4 in household			–0.041	0.027	–0.046	0.013	–0.020	0.307	–0.137	0.111	–0.013	0.534
Number of other children aged 4–5 in household			–0.032	0.342	–0.020	0.554	0.014	0.689	0.188	0.183	0.005	0.883
Number of children aged 6–14 in household			0.015	0.287	0.027	0.051	0.056	0.000	–0.041	0.474	0.063	0.000
Number of adults in household			–0.046	0.001	–0.062	0.000	–0.103	0.000	–0.060	0.312	–0.110	0.000
Household has more than one usual resident per bedroom			–0.005	0.840	0.001	0.980	0.004	0.879	–0.018	0.906	0.006	0.837
No-one in household has completed Year 12					–0.192	0.000	–0.112	0.000	–0.147	0.244	–0.112	0.001
At least one person in household has a degree					0.198	0.000	0.128	0.000	–0.224	0.323	0.133	0.000
Zero or negative household income							–0.225	0.087	–0.388	0.560	–0.219	0.105
Equivalised household income $1–399 per week							–0.088	0.012	0.112	0.473	–0.101	0.006
Equivalised household income $1000 or more per week							0.105	0.000	0.041	0.851	0.106	0.000
Private rental household							–0.062	0.024	0.022	0.881	–0.066	0.020

Explanatory variable	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Coeff	*P*-value	Coeff	*P*-value	Coeff	*P*-value	Coeff	*P*-value	Coeff	*P*-value	Coeff	*P*-value
Community rental household							–0.053	0.391	–0.002	0.990	–0.094	0.180
No-one in household employed							–0.241	0.000	–0.387	0.013	–0.222	0.000
Constant	0.603	0.000	1.276	0.000	1.273	0.000	1.374	0.000	1.575	0.000	1.379	0.000
Sample size	16 867		16 443		16 443		14 966		651		14 315	
Pseudo R-squared	0.001		0.062		0.071		0.079		0.133		0.078	

Source: Customised analysis of 2011 Census Sample File

Appendix B Factors associated with literacy/numeracy and probability of skipping school

TABLE A2. Coefficient estimates and *P*-values for relationship between preschool participation and household education/Indigenous status

	Literacy/numeracy						Skipping school					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
Factor	Coeff	*P*-value	Coeff	*P*-value	Coeff	*P*-value	Coeff	*P*-value	Coeff	P-value	Coeff	*P*-value
Indigenous	–0.692	0.000	–0.519	0.000			0.258	0.000	0.210	0.000		
Female			0.064	0.000	0.076	0.039			0.087	0.000	0.135	0.010
Regional area			0.161	0.000	0.160	0.011			–0.033	0.405	–0.080	0.378
Remote area			–0.187	0.000	–0.142	0.000			0.073	0.006	0.069	0.211
Attended preschool			–0.280	0.000	–0.394	0.000			0.018	0.782	0.137	0.218
At least one parent has a degree or higher			0.120	0.000	0.006	0.902			–0.036	0.256	–0.034	0.617
At least one parent has a post-school qualification			0.439	0.000	0.122	0.007			–0.125	0.000	–0.025	0.699
Neither parent has completed Year 12			0.124	0.000	0.036	0.519			0.040	0.283	0.041	0.611
Index of household wealth			–0.162	0.000	–0.196	0.000			0.116	0.004	0.147	0.050
Constant			0.027	0.001	0.081	0.000			0.004	0.733	–0.008	0.764
Sample size	14 430		13 647		2 504		13 591		13 214		2 381	
Adjusted/pseudo R-squared	0.0746		0.1443		0.0408		0.0049		0.0049		0.0053	

Source: Customised analysis of the 2015 Programme for International Student Assessment

Appendix C Factors associated with wellbeing measures

TABLE A3a. Coefficient estimates for relationship between demographic, geographic and education factors, and economic and subjective aspects of wellbeing

Explanatory variable	Employed (aged 15–64)	Personal income (for employed)	Lives in a household that could raise $2000 in a week	Happy person	So sad that nothing could cheer you up	Low to moderate psychological distress	Life satisfaction
Aged 15–24 years	–0.170	–0.589	0.059	0.206	–0.176	0.096	0.450
Aged 25–34 years	–0.088	–0.052	–0.047	0.122	–0.081	0.096	0.036
Aged 55–64 years	–0.239	0.014	0.215	0.153	–0.173	0.150	0.285
Aged 65 years and over		–0.034	0.559	0.470	–0.484	0.516	0.922
Living in a remote area	0.097	0.062	–0.158	0.255	–0.058	0.127	0.424
Female	–0.289	–0.281	–0.146	–0.152	0.290	–0.296	0.016
Not married	–0.404	–0.414	–0.023	–0.169	0.213	–0.229	–0.417
Couple family with children under 15	–0.142	0.039	–0.133	–0.005	–0.090	0.060	0.252
Couple family with no children under 15 but with dependent children	0.057	0.211	0.033	0.113	–0.097	0.140	0.079
Single-parent family with children under 15	–0.070	0.424	–0.299	0.015	–0.095	0.072	0.050
Single-parent family with no children under 15 but with dependent children	0.082	0.326	–0.291	0.019	–0.086	0.033	–0.085
Other family	0.104	0.400	–0.224	–0.075	–0.039	0.000	–0.165
Lives in a household with at least one non-Indigenous usual resident	0.352	–0.050	0.593	–0.019	–0.148	0.121	0.181
Speaks a language other than English	–0.132	–0.197	–0.339	0.139	0.013	0.030	0.380
Changed usual residence in the 5 years preceding the survey	–0.095	0.046	–0.153	–0.048	0.088	–0.089	–0.133
Completed Year 10 or 11	–0.330	–0.139	–0.252	–0.103	0.180	–0.150	–0.128
Completed Year 9 or less	–0.680	–0.281	–0.515	–0.288	0.358	–0.330	–0.294
Has a degree or higher	1.048	0.516	0.866	0.045	–0.275	0.265	0.318
Has a diploma	0.664	0.386	0.547	0.121	–0.098	0.109	0.100
Has a Certificate I or II	0.100	0.039	0.094	0.032	0.100	–0.117	–0.081
Has a Certificate III or IV	0.586	0.223	0.311	–0.025	–0.056	0.020	–0.004
Constant	0.435	6.920	0.223	0.709	–0.460	0.708	7.187

Source: 2014–15 National Aboriginal and Torres Strait Islander Social Survey

TABLE A3b. Coefficient estimates for relationship between demographic, geographic and education factors, and health and community aspects of wellbeing

Explanatory variable	Self-assessed health fair or poor	Not a daily smoker	Not reporting risky alcohol consumption	Attended cultural events	Able to have a say within the community	Not a victim of physical or threatened violence
Aged 15–24 years	–0.697	0.253	0.180	–0.094	–0.216	–0.076
Aged 25–34 years	–0.387	–0.070	–0.045	–0.035	–0.228	–0.125
Aged 55–64 years	0.191	0.400	0.465	–0.088	0.165	0.347
Aged 65 years and over	0.127	0.883	1.223	–0.161	0.227	0.987
Living in a remote area	–0.278	–0.156	–0.309	0.476	0.056	–0.111
Female	0.071	0.098	0.258	0.119	–0.105	0.094
Not married	0.178	0.211	0.037	–0.018	–0.069	–0.099
Couple family with children under 15	–0.269	0.141	0.199	0.180	0.087	0.075
Couple family with no children under 15 but with dependent children	–0.126	0.232	0.226	–0.034	0.052	0.244
Single-parent family with children under 15	–0.156	–0.166	0.055	0.056	0.027	–0.255
Single-parent family with no children under 15 but with dependent children	0.017	–0.130	0.072	–0.152	–0.012	0.072
Other family	0.003	–0.339	–0.111	–0.087	–0.028	–0.262
Lives in a household with at least one non-Indigenous usual resident	–0.014	0.232	0.043	–0.451	0.004	0.017
Speaks a language other than English	–0.252	0.155	0.497	0.499	0.142	0.244
Changed usual residence in the 5 years preceding the survey	0.058	–0.123	–0.018	–0.037	–0.065	–0.162
Completed Year 10 or 11	0.073	–0.413	0.039	–0.119	–0.044	–0.164
Completed Year 9 or less	0.292	–0.516	0.077	–0.065	–0.040	–0.233
Has a degree or higher	–0.267	0.533	0.397	0.652	0.270	–0.100
Has a diploma	–0.161	0.152	0.157	0.388	0.309	–0.101
Has a Certificate I or II	–0.022	–0.021	–0.014	0.214	0.071	–0.166
Has a Certificate III or IV	–0.027	0.034	0.090	0.202	0.167	–0.052
Constant	–0.458	0.276	0.376	0.292	–0.522	1.038

Source: 2014–15 National Aboriginal and Torres Strait Islander Social Survey

TABLE A3c. *P*-values for relationship between demographic, geographic and education factors, and economic and subjective aspects of wellbeing

Explanatory variable	Employed (aged 15–64)	Personal income (for employed)	Lives in a household that could raise $2000 in a week	Happy person	So sad that nothing could cheer you up	Low to moderate psychological distress	Life satisfaction
Aged 15–24 years	0.001	0.000	0.244	0.000	0.000	0.052	0.000
Aged 25–34 years	0.054	0.093	0.305	0.008	0.063	0.032	0.612
Aged 55–64 years	0.000	0.733	0.000	0.006	0.001	0.006	0.001
Aged 65 years and over		0.719	0.000	0.000	0.000	0.000	0.000
Living in a remote area	0.025	0.046	0.000	0.000	0.145	0.002	0.000
Female	0.000	0.000	0.000	0.000	0.000	0.000	0.760
Not married	0.000	0.000	0.743	0.019	0.002	0.001	0.000
Couple family with children under 15	0.010	0.261	0.013	0.930	0.078	0.256	0.003
Couple family with no children under 15 but with dependent children	0.479	0.000	0.676	0.153	0.191	0.069	0.513
Single-parent family with children under 15	0.451	0.000	0.001	0.872	0.265	0.409	0.721
Single-parent family with no children under 15 but with dependent children	0.406	0.000	0.002	0.847	0.347	0.725	0.574
Other family	0.261	0.000	0.011	0.402	0.645	0.996	0.233
Lives in a household with at least one non-Indigenous usual resident	0.000	0.098	0.000	0.654	0.000	0.004	0.007
Speaks a language other than English	0.016	0.000	0.000	0.013	0.802	0.564	0.000
Changed usual residence in the 5 years preceding the survey	0.009	0.069	0.000	0.167	0.008	0.009	0.015
Completed Year 10 or 11	0.000	0.000	0.000	0.021	0.000	0.001	0.061
Completed Year 9 or less	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Has a degree or higher	0.000	0.000	0.000	0.564	0.000	0.001	0.008
Has a diploma	0.000	0.000	0.000	0.100	0.157	0.131	0.379
Has a Certificate I or II	0.054	0.330	0.069	0.549	0.044	0.021	0.329
Has a Certificate III or IV	0.000	0.000	0.000	0.570	0.182	0.643	0.958

Source: 2014–15 National Aboriginal and Torres Strait Islander Social Survey

TABLE A3d. *P*-values for relationship between demographic, geographic and education factors, and health and community aspects of wellbeing

Explanatory variable	Self-assessed health fair or poor	Not a daily smoker	Not reporting risky alcohol consumption	Attended cultural events	Able to have a say within the community	Not a victim of physical or threatened violence
Aged 15–24 years	0.000	0.000	0.001	0.065	0.000	0.142
Aged 25–34 years	0.000	0.111	0.339	0.446	0.000	0.007
Aged 55–64 years	0.000	0.000	0.000	0.110	0.002	0.000
Aged 65 years and over	0.048	0.000	0.000	0.016	0.001	0.000
Living in a remote area	0.000	0.000	0.000	0.000	0.181	0.010
Female	0.042	0.003	0.000	0.000	0.002	0.009
Not married	0.023	0.003	0.640	0.800	0.335	0.200
Couple family with children under 15	0.000	0.006	0.001	0.001	0.096	0.193
Couple family with no children under 15 but with dependent children	0.106	0.003	0.012	0.656	0.491	0.007
Single-parent family with children under 15	0.100	0.058	0.573	0.533	0.764	0.007
Single-parent family with no children under 15 but with dependent children	0.863	0.168	0.499	0.113	0.901	0.487
Other family	0.971	0.000	0.256	0.328	0.752	0.006
Lives in a household with at least one non-Indigenous usual resident	0.747	0.000	0.359	0.000	0.922	0.701
Speaks a language other than English	0.000	0.002	0.000	0.000	0.007	0.000
Changed usual residence in the 5 years preceding the survey	0.103	0.000	0.637	0.286	0.062	0.000
Completed Year 10 or 11	0.116	0.000	0.406	0.007	0.312	0.000
Completed Year 9 or less	0.000	0.000	0.159	0.203	0.432	0.000
Has a degree or higher	0.001	0.000	0.000	0.000	0.000	0.230
Has a diploma	0.027	0.031	0.055	0.000	0.000	0.190
Has a Certificate I or II	0.687	0.675	0.801	0.000	0.183	0.002
Has a Certificate III or IV	0.540	0.417	0.057	0.000	0.000	0.255

Source: 2014–15 National Aboriginal and Torres Strait Islander Social Survey

Notes

1. Evidence strongly suggests that one of the main determinants of Indigenous health outcomes is their relative socioeconomic position (Marmot 2011), with many of the social determinants of health potentially amenable to policy influence. However, for policy to be effective, it must also recognise that health at any particular age is affected by the cumulative experiences of the individual up to that point in time, including previous health policy (Ring et al. 2016).

   There is evidence that early childhood education has both short-term and long-term benefits for Indigenous children (Arcos-Holzinger & Biddle 2015), and that policy can increase participation rates in early childhood education (Prout Quicke & Biddle 2016), which itself affects literacy and numeracy development, school completion and post-school study options (Hancock et al. 2013).

   A key determinant of employment for Indigenous Australians is the level of education completion (Biddle & Cameron 2012), with strong evidence for high rates of return both relative to the non-Indigenous population and across geographic areas.

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